



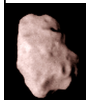
PDS SMALL BODY NODE COMET DATA REVIEW



**COMPUTER AND SPACE SCIENCES BUILDING 2316
UNIVERSITY OF MARYLAND
COLLEGE PARK, MD
05 MARCH 2013**

Asteroid Lutetia and Steins Shape Models

Tom Duxbury / Lian-Yang Li



5 March 2013

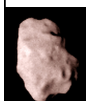
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ASTEROID LUTETIA SHAPE MODEL



- aareadme.txt – complete
- CATALOG
 - All required .cat files were included
 - dataset.cat
 - Even though a constant axis orientation is given, it is recommended that an epoch date be given with the RA,Dec in the TABLE: e.g., 10 July 2010 15:45 UT
 - Planetocentric coordinates is GOOD
 - Recommend a short blurb about coordinate axes for cartesian coordinates of vertices (e.g, xyz are othogonal axes, along the principal axes with origin at center of figure, x-y in equatorial plane and z along polar axis)
 - Mean diameter = 98 km but A,B,C = 121, 101, 175 km all > 98 km
(Reviewer also computed mean diameter = 98 ± 6.9 (1 σ) km and density = 3,447 kg/m³ from dataset)
 - It is believed that 175 km for C radius is a typo that should be 75 km
 - PCK: Radii - 130 x 100 x 90 km; Pole - 51.8 x 10.83 deg agree
 - insthost.cat - very detailed / complete
 - mission.cat – very detailed / complete
 - osinac_inst.cat and osiwac_inst.cat – very detailed / ~complete
 - There are SPICE Instrument and Frames kernels
- reference.cat – complete



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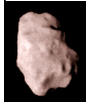




ASTEROID LUTETIA SHAPE MODEL



- Document
 - docinfo.txt – complete
 - plate_shape_definition.asc (very important file)
 - Replace “Temple 1” with “Lutetia”
 - Good detail on coordinate axes / coordinates
 - Was angular momentum vector observed / inferred?
 - Why is “C” axis the longest – which axis is the angular momentum vector
 - Discussion of 359 deg connecting back to 0 deg is almost clear
 - What if spatial resolution < 1 deg?
 - Is there no point at 360 deg – what is the problem replicating the 0 deg point?
 - plate_shape_definition.lbl - complete



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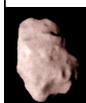


ASTEROID LUTETIA SHAPE MODEL



- index
 - checksum.lbl – complete
 - checksum.tab – not familiar with this (looks impressive and complete)
 - index.lbl - complete
 - index.tab - complete
 - indexinfo.txt – complete

- voldesc.cat - complete



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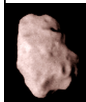


ASTEROID LUTETIA SHAPE MODEL



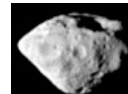
- Data
 - lutetia_3e6_cart.lbl
 - Recommend adding a sentence or two on defining the xyz coordinate system: center, axes (reference plane/pole), planetocentric, epoch of data
 - lutetia_3e6_cart.dat
 - ~Complete
 - Center-of-figure offset (selected center needs to be defined in dataset.cat and lutetia_3e6_cart.lbl)
 - $\Sigma X = +0.420 \text{ m}$, $\Sigma Y = +0.939 \text{ m}$, $\Sigma Z = +0.338 \text{ m}$
 - Average diameter: $98.03 \pm 6.94 (1\sigma) \text{ km}$ – Agree with delivery
 - Computed Diameters*: A (X): 106.2 km; B (Y): 110.4 km; C(Z): 76.6 km
 - Delivery Diameters: A (?): 121.0 km; B (?): 101.0 km; C(?): **175.0 km**
(Both give same mean diameter = ~96 km w/ **175** set to 75)
 - DEFINITIONS of A,B,C and X,Y,Z axes would be helpful

NOTE * with center-of-figure offset removed

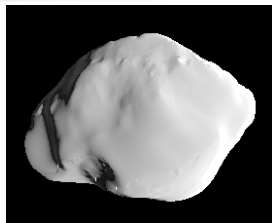


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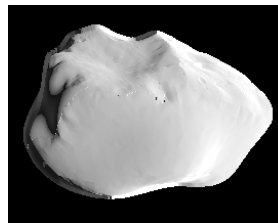
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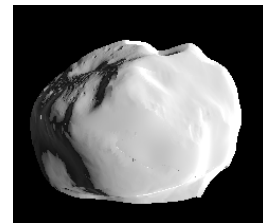
ASTEROID LUTETIA SHAPE MODEL



(0,0)

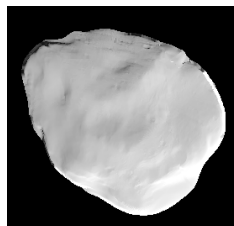


(0,120)

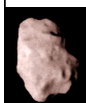


(0,240)

North Pole




South Pole




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




ASTEROID STEINS SHAPE MODEL





- aareadme.txt – complete
- CATALOG
 - All required .cat files were included
 - dataset.cat
 - Even though a constant axis orientation is given, it is recommended that an epoch date be given with the RA,Dec in the TABLE: e.g., 5 September 2008 18:38:20 UT
 - Recommend a short blurb about coordinate axes for cartesian coordinates of vertices (e.g. xyz are uthogonal axes, along the principal axes with origin at center of figure, x-y in equatorial plane and z along polar axis)
 - Diameters $A > B > C$ is GOOD
 - No mention of „Planetocentric“ or ??? Coordinates
 - PC Kernel:
 - insthst.cat - very detailed / complete
 - mission.cat – very detailed / complete
 - osinac_inst.cat and osiwac_inst.cat – very detailed / ~complete
 - There are SPICE Instrument and Frames kernels
- reference.cat – complete




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




ASTEROID STEINS SHAPE MODEL




- Document
 - docinfo.txt – complete
 - plate_shape_definition.asc (very important file)
 - Replace “Temple 1” with “Steins”
 - Good detail on coordinate axes / coordinates
 - Discussion of 359 deg connecting back to 0 deg is almost clear
 - What if spatial resolution < 1 deg?
 - Is there no point at 360 deg – what is the problem replicating the 0 deg point?
 - plate_shape_definition.lbl - complete



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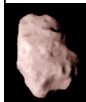


ASTEROID STEINS SHAPE MODEL



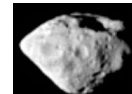
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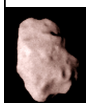
ASTEROID STEINS SHAPE MODEL



- Data
 - steins_cart.lbl
 - Recommend adding a sentence or two on defining the xyz coordinate system: center, axes (reference plane/pole), planetocentric, epoch of data
 - steins_cart.dat
 - ~Complete
 - Center-of-figure offset (selected center needs to be defined in dataset.cat and steins_cart.lbl)

$$\sum X = +0.229 \text{ m}, \quad \sum Y = +0.041 \text{ m}, \quad \sum Z = +0.024 \text{ m}$$
 - Computed Diameters*: A (X): 6.23 km; B (Y): 5.28 km; C(Z): 3.95 km
 - Computed average: 5.06 km
 - Delivery Diameters: A (X): 6.83 km; B (Y): 5.70 km; C(Z): 4.42 km
 - Delivery average: 5.56 km
 - PC Kernel Diameters: A(X): 6.70 km; B(Y): 5.90 km; C(Z): 4.30 km
 - Pole: Delivery: 99.0 x -59.0 deg; PC Kernel: 90.68 x -62.14 deg

NOTE * with center-of-figure offset removed



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